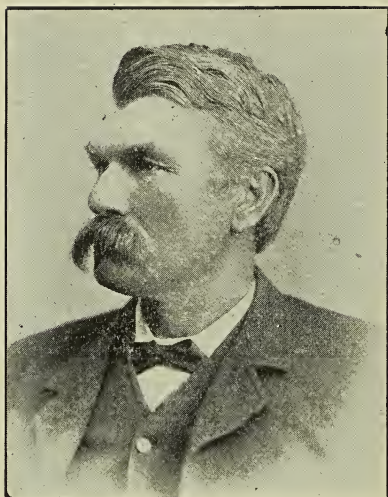


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COLONEL J. H. BRIGHAM,
Assistant Secretary of Agriculture.

[See page 89.]

THE AGRICULTURAL STUDENT.

VOL. VI.

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STAFF.

C. B. STEWART.	E. O. FIPPIN.
C. W. EDDY.	F. W. TAYLOR.
C. N. MOONEY.	MISS MAMIE F. HILL.

EDITORIAL CHAT.

The work in the Dairy Department has started under conditions which bid fair to mark the sixth session as one of the most successful in the history of the course. The number of special students enrolled Friday, January 5th, was 19, which is in excess of the number enrolled upon the same date any previous year. A corps of instructors have been obtained which cannot be excelled in any other dairy school in the country, and the evident appreciation of the efforts made by the University in behalf of the dairymen and farmers of the country is indeed gratifying.

The prospects for graduates in dairy work was never brighter than at the present time, and those who faithfully avail themselves of the opportunities here offered will be in demand to fill responsible positions in this line.

The Agricultural Students' Union will meet in Townshend Hall, Wednesday evening, January 10, 1900. An excellent program has been prepared and the meeting will be highly interesting and profitable. The success of the work depends to a large extent upon the students of the agricultural colleges, and it is to be desired that every agricultural student will be present at this meeting and become acquainted with the work being done by the Union.

Very few people ever have the opportunity to witness the beginning and ending of more than one century. No previous century has yielded so much to the knowledge and happiness of mankind than the one just closed, and none has begun with so much promise for the future as the one just beginning. Mankind has learned more in the last century in every branch of science than in all the previous centuries combined.

At the beginning of the 19th century oxygen had just been discovered. It is scarcely possible to put ourselves back into the frame of mind in which oxygen was unknown. When we look at the stupendous edifice of science which has been reared on this basis, it seems almost incredible that a single century can have witnessed so much advancement.

In 1781 the known solar system consisted of sun, earth, moon, and the five planets visible to the naked eye. The invention of the telescope has added myriads to this number, and the spectroscope has revealed a common chemical composition. The great principles of a scientific geology were ushered in by Lyell in 1830, which, when once the truth of them began to be distinctly realized, the conception of evolution was irresistibly forced upon men's attention.

This was further strengthened by the conceptions of metamorphosis and homology of plants and animals brought forward by Göethe and Linnæus.

In every branch of science similar discoveries have been made, and such names as Newton, Laplace, Lyell, Cuvier, Darwin, Spencer, Huxley, Gray, and many others have become household words to all who pretend to keep in touch with the times. But in spite of the wonderful stride already made the closing century has only been the time of planting and cultivation. The harvest is yet to come. As we each expect to be benefited let us endeavor to contribute our mite to the ever swelling stream of knowledge.

Columbus Horticultural Society.

The annual meeting of this Society was held December 30th, in the Horticultural Hall of the University. Professor Hunt gave an interesting address upon the "Horticulture of the Pacific Coast," and reports were given by the officers and standing committees. The report of the Treasurer showed that the Society now has a permanent investment of \$5,800.

After the regular program the election of officers for the coming year was held, which resulted as follows:

President—Wm. R. Lazenby.
Vice President—T. A. Scott.
Treasurer—Geo. W. Sinks.
Secretary—Homer C. Price.

PROGRAM

OF THE SIXTH ANNUAL MEETING OF THE
OHIO STATE DAIRYMEN'S ASSOCIATION,
TO BE HELD IN TOWNSHEND HALL, ON
TUESDAY AND WEDNESDAY, FEBRUARY
13 AND 14, 1900.

Tuesday, 10 A. M.

Address of Welcome—Dr. W. O. Thompson, President Ohio State University.

Response by President of the Association—D. A. Crouner, Columbus, O.

"Dairy Products from the Stable to the Table"—C. D. Hess, Chillicothe, O.

"Manufacture of Farm Butter on the Farm"—W. C. Whitehead, Pataskala, O.
Question Box.

Nomination of committees.

Tuesday, 2 P. M.

J. T. Bentley, Circleville, Ohio, Chairman of the Butter Division, presiding.

"Making Butter from Pasteurized Cream, Considered from a Sanitary Standpoint"—H. R. Heath, Ossian, Ind.

"The Science of Manufacturing Fine Creamery Butter"—Oscar Reed, Lebanon, O.

"American Progress in Dairying"—Major Henry E. Alvord, Chief of Dairy Division, Department of Agriculture, Washington, D. C.

"Milking Machines"—Director C. S. Plumb, Purdue University and Experiment Station, Lafayette, Ind.

Election of Chairman and Secretary of Butter Division, and one member of Board of Directors.

Tuesday, 7:30 P. M.

Election of officers for ensuing year. Report of committees. General business.

8 P. M.

"Bovine Tuberculosis and Its Relation to the Public Health"—Director C. E. Thorne, Experiment Station, Wooster, O.

Discussion opened by Dr. D. S. White, Dean of the College of Veterinary Medicine, O. S. U.

"American Dairy Products at the Paris Exposition in 1900"—Major Henry E. Alvord, Chief of the Dairy Division, U. S. Department of Agriculture, Washington, D. C.

Wednesday, 8 A. M.

Inspection Dairy School.

9 A. M.

Albert French, Chairman of Milk Division, presiding.

"Practical Illustration in Judging and Scoring Cattle"—Director C. S. Plumb, Purdue University and Experiment Station, Lafayette, Ind.

"Breeding vs. Feeding"—Col. A. T. Dempsey, Columbus, O.

"The Place of Roughage in the Ration for Cattle"—Dean Thos. F. Hunt, College of Agriculture and Domestic Science, O. S. U.

Question Box.

Election of Chairman and Secretary of Milk Division, and one member of Board of Directors.

Wednesday, 1 P. M.

E. C. Rice, Triumph, O., Chairman of Cheese Division, presiding.

"By-Products of the Dairy"—Dillwyn Stratton, Winona, O.

"The Use of Starter in Cheddar Cheese Making"—Elisha Smith, Greensburg, O.

"Is it Best for Ohio Cheese Makers to Receive Milk Six or Seven Days Per Week"—E. C. Rice, Triumph, O.

"Some of the Difficulties Met with in Cheese Making"—John Hockensmith, Huntington.

"How Can We Make Better Cheese in Ohio?"—Professor J. W. Decker, Ohio Dairy School.

Election of Chairman and Secretary of Cheese Division and one member of Board of Directors.

A large number of valuable premiums have been offered for dairy exhibits by the Association, and several manufacturers and dealers have signified their intention of exhibiting apparatus and supplies. Additional premiums are also offered by the French Bros.' Dairy Co., Cincinnati, O.; the Creamery Package Co., Chicago, Ill., and the Wells & Richardson Co., Burlington, Vt.

Student's Cattle Judging Contest.

The prizes for judging cattle annually offered by W. B. Smith & Son, of Columbus, O., to the students in the class of breeds of live stock at the University, were awarded on December 13th, at the

class room in Townshend Hall. President Thompson, with a few well chosen remarks, made the presentation of the money and badges to the following students:

First prize—F. W. Taylor, Wooster, O., badge and \$10.

Second prize—Norton Dock, Cincinnati, O., badge and \$8.

Third prize—Clarence B. Hoover, Venice, O., badge and \$7.

Fourth prize—C. C. Hatfield, Lebanon, O., badge and \$6.

Fifth prize—J. B. Crabb, Mt. Sterling, O., badge and \$4.

The cattle scored were five from the Holstein-Friesian herd of W. B. Smith & Son, and five from the Jersey herd of Mrs. J. E. Hall, both of Columbus. The scoring was done under the instruction of Prof. Hunt and the awards were made on a comparison of each students' score with that of Prof. Hunt's on each animal.

[These prizes, through the generosity of Mr. Smith and son, have now been offered for five consecutive years. It is a very significant fact that men who have no connection whatever with the University take interest enough in the work of the students here in one class to donate \$35 annually to the members of that class alone.

On the other hand it shows the importance that is attached to thorough training in the art of scoring and judging live stock. The ability of these student judges in the department of animal husbandry is coming to be recognized by breeders all over the State. A certain breeder of thoroughbred cattle who exhibited his stock at several county fairs last year, remarked that he would sooner trust his cattle to be judged in the hands of a class of student judges than in those of any of the eight judges who scored his cattle at the several fairs. This is perhaps a pretty strong statement and rather hard on our county fair judges. On the other hand, the offer of the prizes is an incentive among the students to do thorough work and to learn to use their eye and judgment with a degree of certainty and precision.

F. W. T.

PROGRAM

OF THE STATE FARMERS' INSTITUTE, HELD IN THE COUNCIL CHAMBER, CITY HALL BUILDING, TUESDAY AND WEDNESDAY, JANUARY 9 AND 10, AND THE ANNUAL MEETING OF THE OHIO STATE BOARD OF AGRICULTURE, HELD IN THE COUNCIL CHAMBER, CITY HALL BUILDING, THURSDAY, JANUARY 11, 1900.

State Farmers' Institute.

Tuesday, January 9, 10 o'clock A. M.

Address—President John Begg, Columbus Grove, O.

Address—Frost Warnings and the Protection of Crops from Frost: J. Warren Smith, Section Director, Weather Bureau, Columbus, O.

Discussion of subject.

Address—Benefits of Co-Operation in Marketing Fruits: W. H. Owen, Catawba Island, O.

Discussion of subject.

2 O'clock P. M.

Address—European Dairying, Illustrated: Prof. John W. Decker, Ohio State University, Columbus.

Discussion of subject.

Address—The Traveling Library; Its Possibilities for the Rural Community: Mrs. Mary E. Lee, New Plymouth, O.

Discussion of subject.

Address—The Results and Value of the Study of Plant Diseases: Prof. Augustine D. Selby, Agricultural Experiment Station, Wooster, O.

Discussion of subject.

7:30 O'clock P. M.

Address—The Manufacture of Beet Root Sugar, Illustrated: Prof. H. A. Weber, Ohio State University, Columbus.

Address—Character as Affected by Country Life: J. Al Dobie, Gutman, O. Wednesday, January 10, 10 o'clock A. M.

Address—Is the Swine being Improved in Breeding Qualities: John L. Dorn, Crestvue, O.

Discussion of subject.

Address—The Present and Future of Sheep Husbandry: W. N. Cowden, Quaker City, O.

Discussion of subject.

Address—Fifty Years' Experience in Raising and Marketing Corn: S. H. Todd, Wakeman, O.

Discussion of subject.

2 O'clock P. M.

Address—The Closing Century: S. K. McLaughlin, Hurford, O.

Discussion of subject.

Address—The Education of Our Girls: Mrs. Mary E. Lee, New Plymouth, O.

Discussion of subject.

Address—Wheat: George E. Lawrence, Marion, O.

Discussion of subject.

Annual Meeting of the Ohio State Board of Agriculture.

Thursday, January 11, 10 o'clock A. M.

Prayer—Rev. C. L. Winget, Columbus, O.

Address of Welcome—Hon. George K. Nash, Governor of Ohio.

Annual Address—L. G. Ely, President State Board of Agriculture.

Annual Report—H. S. Grimes, Treasurer, State Board of Agriculture.

Report of Auditing Committee—S. H. Ellis, B. P. Baldwin, D. J. Green.

Appointment of committees.

Nomination of candidates for election as members of the State Board of Agriculture.

2 O'clock P. M.

Address—A Glance at Some of the Conditions Necessary to Continually Maintain and Successfully Carry On an Annual State Agricultural Fair: S. H. Ellis, Waynesville, O.

Discussion of subject.

Address—How Shall We Maintain the Fertility of the Soil? Norman J. Colman, ex-Secretary of Agriculture, St. Louis, Mo.

Discussion of subject.

Address—Agricultural Progress During the Last Two or Three Decades: J. H. Brigham, Assistant Secretary, U. S. Department of Agriculture.

Discussion of subject.

Address—A Study of Taxes: Dr. W. O. Thompson, President Ohio State University, Columbus.

Discussion of subject.

Address—The Scope and Purpose of the Ohio Centennial of 1902: Daniel J. Ryan, Columbus, O.

Discussion of subject.

Address—The Farmer and the Weather Bureau, Illustrated: J. Warren Smith, Section Director Weather Bureau, Columbus, O.

Discussion of subject.

Report of Committee on Resolutions.

Miscellaneous business.

7:30 O'clock P. M.

Election of two members of the State Board of Agriculture.

Colonel J. H. Brigham.

Col. J. H. Brigham was born at Lodi, Medina County, Ohio, December 12, 1838. He lived on a farm in that county until he moved, with his parents, into Fulton County, in 1852. He gained such education as the country schools afforded and then taught school in winter, while working on the farm the remainder of the year. His college education consisted of one year each at Berea University and the Lebanon Normal School. When the war broke out he enlisted as a private in the 69th Ohio, a regiment that made a glorious record, a large part of which was achieved under his command. He came out Colonel of his regiment, and well earned every step of his promotion.

Upon his muster-out he returned to his farm in Fulton County, and took an active part in the formation of the Grange in 1873. His ability speedily

brought him to the front in the Order and he has the distinguishing honor of serving five consecutive terms as Master of the National Grange, no one working more zealously to promote its interests. Every year of his administration enhanced his reputation until he acquired the position of one of the most progressive farmers in the United States.

Upon the election of President McKinley, the farmers of the entire country determined that the office of Secretary of Agriculture should be filled by a man from their own ranks, and petitions from a large majority of States were received by the President asking for the appointment of Mr. Brigham. One Cabinet officer, however, had been chosen from Ohio and it became impolitic to select another from the same State. But the wish of the farmers was remembered, and a champion of their interests was appointed as Secretary, while Mr. Brigham was appointed his Assistant, March 22, 1897. Under the direction of these champions of the farmers' interests agriculture in the United States has received a wonderful impetus and something like its share of governmental notice.

Employment Agencies for Farmers.

Within the past ten years free public employment offices have been established in a number of States in connection with the State bureaus of labor statistics. The States having these public offices at the present time are Ohio, New York, Missouri, Nebraska, Kansas, Maryland, and Illinois; and in Seattle, Wash., there is a municipal employment office in charge of the city Labor Commissioner. Municipal employment offices are also authorized by law in Montana, but as yet none has been actually established.

In addition to the offices mentioned above, the Commissioners of Labor or other officials in several States have

agreed to act as intermediaries between farmers and farm laborers, in response to the circular letter from this office referred to in the Crop Reporter for November. This is true of the North Dakota Commissioner of Agriculture and Labor, the West Virginia Commissioner of Labor, the Arkansas Commissioner of Mines, Manufactures, and Agriculture, the Colorado Labor Commissioner, and the Secretary of the Vermont State Board of Agriculture.

Among the most important of the many employment bureaus maintained by private philanthropy are the Industrial Aid Society of Boston, which reports as its best work the sending of men and women to the country, and the Cooper Union Labor Bureau of New York City, which has done some work of that kind each year it has been in operation. Another remarkably successful employment department is that of the Nashville Relief Society, which has not failed to find a place for a single person applying to it for work.

Most of the local Young Men's Christian Associations maintain employment bureaus or registers, which in some cases are for the assistance of their own members only in obtaining situations, but more often, apparently, receive applications from members and non-members alike. Many of these associations report that some of their applicants would be willing to go into the country for work. The Bowery Branch of the association in New York City may be said to make a specialty of out-of-town employment, sending a number of men to the country every year; and many of the other local associations send applicants to the country whenever possible.

Among the educational institutions to which the Department's circular letter relating to summer employment for students was sent, were all the land-grant agricultural colleges and many other in-

stitutions giving courses in practical agriculture. It appears from the replies received that some of these institutions already perform the function of employment agencies for their students and graduates. As might be expected, the graduates of schools in which agricultural training is given are considered especially desirable as farm laborers, foremen, etc., and the demand for this class of skilled labor often exceeds the available supply.

Professor Thomas F. Hunt, Dean of the College of Agriculture and Domestic Science of the Ohio State University, writes as follows:

While it is not part of my official duty to do so, I have taken a great deal of pains in, and derived a great deal of pleasure from, securing employment for our students and ex-students. I endeavor to keep track of every student who has been in this college since I have been connected with it, and try to know right where he is and whether he is available, in case I have an inquiry for help of any particular kind or grade connected with agricultural pursuits * * * I should add, however, that our students generally expect to get, and do get, a compensation beyond that of ordinary farm laborers.

Of 200 recent ex-students of the College of Agriculture of the Ohio State University, 80 are farmers, 40 cheese or butter makers, 28 farm foremen or farm employes, while 10 are teachers in colleges.

It may be of interest to know what opportunities there are for young men who have taken the agricultural course but do not have the capital to engage in farming. During the past two years eleven graduates of the College of Agriculture have been appointed to positions, which they are now filling. The salary of two I do not know. The average salary of the remaining nine is \$832

per annum, and the average time these young men have been out of college is twenty-six months. The positions include superintending farms, experiment-station work and teaching. One graduate has resigned a position of \$600 per year, where he could have remained at a considerable advance in compensation, in order to engage in farming, and another, who had been receiving \$1,000 per year, refused to be considered for a \$1,200 position because he had definitely decided to engage in farming. For the above position and another at \$1,300 I was unable to recommend suitable persons, when asked to do so, for want of persons who were available. In the same period a much larger number of persons, who have taken less than a four years' course, have been appointed to positions in creameries, cheese factories, and on farms.

Of the students of the Dairy School last winter, I have heard directly or indirectly from all but two, and without an exception, they have had employment either in creameries, cheese factories, or on dairy farms. I have good reason for believing, that two young men, from whom I have not heard, are both running creameries.

The following is from Professor W. A. Henry, Dean of the College of Agriculture, University of Wisconsin:

We have with us each year a very considerable number of students pursuing the short course of agriculture, or those who have completed the same, that find places with general farmers, gardeners, dairymen, stockmen, etc. Since the 1st of March we have placed 101 of our students in positions ranging all the way from managers down to good farm laborers.

Many of our Dairy School students likewise seek positions as operators of creameries and cheese factories. Some scores of these have been placed by us during the last year.

I am pleased to report that the call for our short-course and dairy students is far beyond our ability to supply. We have received as high as a dozen letters a day on this subject from farmers, creamery men, etc. * * * Our Dairy School building was erected in 1891, and from that time to the present we have never been able to accommodate all who sought admission, nor have we been able to furnish butter and cheese makers from among our pupils to all who have called for them. The applications for admission to the Dairy School are more numerous this year than ever before, and there is promise of an increased attendance in the short course, which has almost reached the limits of our present accommodations.

Professor C. F. Curtis, of the Iowa Agricultural College, writes that there are always a number of students wishing to obtain work on farms during the summer vacation, and also during the winter vacation, which in that institution extends this year from November 22 to February 15, and will hereafter cover a period of about two months.

Mr. Clinton J. Calloway, principal of the Kowaliga Academic and Industrial Institute (colored), Kowaliga, Ala., writes that the school year in that institution is divided so as to enable the students to be on farms during the busy parts of the year; the vacations extending through May and June, September and October, with a two months' school session in midsummer.—United States Department of Agriculture.

Corn and Its Production.

In considering the great advancement that has been made in the mechanical pursuits within the last quarter of a century the farmer very often fails to recognize the benefits that science has conferred upon him. It is true, the inventive genius of man has perfected machines by

which one man may now do the work that formerly required ten, while the railroad and the steamship empower him to send the products of his labor to the antipodes. If there is one name which deserves to be held up before the farmer more than another it is that of the man who first applied chemistry to Agriculture. The work of Leibig, nearly three-quarters of a century ago, is the foundation of the science and art of agriculture as known to-day. That this is true may be seen from a glance at a single product of the farm. This year's crop of corn in the United States has been estimated at more than 2,000,000,000 bushels. Of this amount probably 240,000,000 bushels will be shipped to foreign countries. The question naturally arises, what becomes of the millions of bushels that remain at home? Are they consumed as corn or are they transformed into new products? In answering these questions we must say that by far the greater part of it is consumed in producing the pork and beef for which we are so deservedly renowned. Then too, much of it is consumed directly as human food. In a bulletin issued by the United States Department of Agriculture some time ago, more than 120 receipts were given for using corn as an article of food.

The immense production of corn within the past few years has led the chemist to turn his attention to that product in order that he might discover new uses to which it could be put. How well he has succeeded, may be understood when it is known that there are at present twenty-nine distinct commercial products of corn. Of these, twenty are derived from the grain.

Among the most commonly known, are the various forms of glucose, starch, and sugar. Besides, there are flourine, used by mixers of flour; corn oil, used by table oil mixers, lubricating oil mix-

ers, manufacturers of fibre, paint, etc.

The new smokeless powder owes its existence to the distilled spirits from corn. Orders have recently been placed with a Chicago company for over one million gallons for this purpose, and the demand is continually increasing.

Probably one of the most important of the recent products is rubber. It has been brought to such a state of perfection by Chicago chemists that it is adapted to nearly all the uses to which ordinary rubber is put, from bicycle tires to linoleum. It is derived from the waste, in the manufacture of glucose. Before its discovery five per cent. of the corn used in the production of glucose could not be utilized. Now this by-product promises great profit.

Aside from the grain, another important part of the corn plant is the stalk. Heretofore, with but few exceptions, it has been almost a complete loss. It now gives rise to nine commercial products and, where accessible, is valued at \$6 to \$12 per acre.

The corn stalk, stripped of leaves and tassel, consists of 26 per cent. of nodes or joints; 20 per cent. of pith, coarse and fine; and 54 per cent. of shell or shives. About 36 per cent. of the whole is cellulose. Cellulose is, technically speaking, the cell walls of a plant and forms the basis of several of these corn products. It is used as a packing for battle-ships and for nitrating purposes in the manufacture of high explosives. In the liquid form it is employed as a varnish for an unlimited number of purposes.

Corn stalks also yield a paper pulp, while the shell, where finely ground, is a cattle food of greater nutritive value than timothy hay, and may be used as an absorbent in feeding, molasses and blood.

At present the Marsden Company control this entire process, together with the machinery used, and are erecting plants

at Owensboro, Ky.; Linden, Ind.; Peoria, Ill., and Newport News, Va.

The industries based on the products of corn promise to become of great importance to both the farmer and the capitalist. The day is fast passing when the rural population will look with a sneer upon the application of science to their vocation.

E. C. FIPPIN.

Some Investigations in Phenology.

As the development of a plant must undoubtedly depend upon the sum of all the influences which may affect it; phenologists have devoted much time to the study of the correction of climatic conditions with the epoch or phases in plant growth.

They believe that if they can find approximately the relation of climate to the development of plants, they will be able to foretell with reasonable exactness the probable date of harvesting and also to a certain extent the quantity to be expected.

The manufacturer calculates his output under certain conditions and over which he exerts control. The farmer also decides his output by determining the number of acres he will sow and the probable return therefrom, but unlike the manufacturer he has less control over the conditions which affect his productions. He may have very fertile soils and the best exposure and put the soil in best physical shape, but he can not control the weather.

In plant growth sunshine is the active agent and furnishes besides heat, light and chemical reactions. Water brings nourishment to the plant, but the quantity of material within the plant that can be worked over so as to be useful to it must be proportional to the quantity of sunshine received by it. From this we conclude that there must be a definite relation between the water or rainfall and

the quantity of sunshine or heat that can be called the most favorable ratio.

Linsser, in his investigations of the geographical distribution of plants, made the ratio of annual sunshine divided by annual rainfall as the local climatic constant and the fractional portion of the annual sum-total of heat that is needed to bring the plant up to any stage of vegetation the physiological constant. He invented a method of computing the daily temperatures above freezing for each day of the year and for all parts of the globe for what he called the normal plant. He then computed these temperatures for the same plant in different latitudes and found that stages of development are obtained by much smaller sum-totals of temperatures at northern than southern stations. He found no uniform constant and no uniform minimum temperature, but discovered a thermal law about as follows:

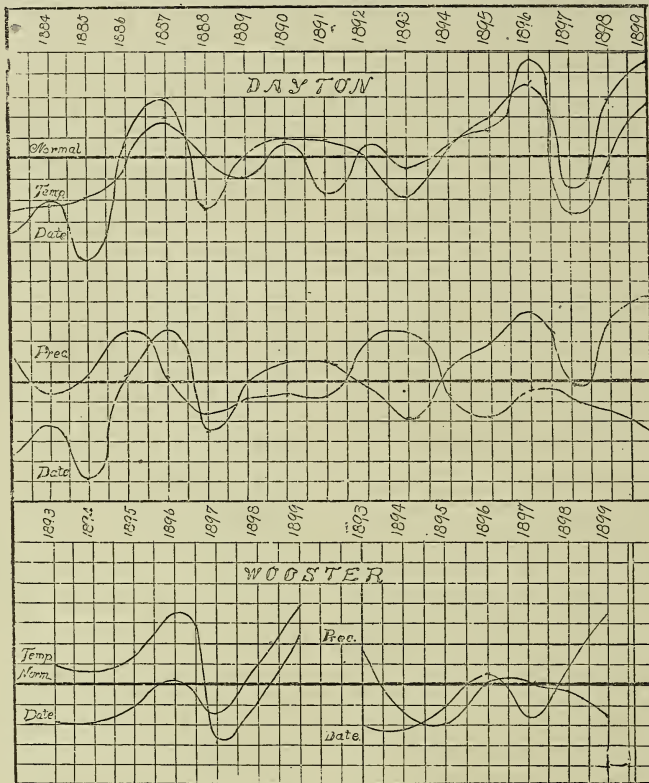
"Every individual plant possesses the ability to regulate its vital activity as demanded by the total heat available in its dwelling place, and also according to that inherited from its ancestors, so that individuals of the same species, living in different places, arrived at same stage of development by utilizing the same proportions of total heat to which they are accustomed." Or in other words, "The rate of development is equal to the quotient of the effective temperatures to which plants during life are exposed, divided by the normal total sums to which the mother plants have for generations been accustomed." He says there are two special laws regulating the life of every individual plant. "First, the individual habit; second, the principle of economy as applied to heat and moisture." "If either the heat or moisture varies, then the plant is warned of the necessity of economy and the whole life of the plant is intimately dependent on the variation, annual or otherwise, of

that factor. And if both factors vary, which occurs frequently, then the law of economy stimulates the plant to develop in accordance with these vicissitudes." [Vol. I, Maryland Weather Service.] Other phenologists tried to find thermal constants, and each have different ways of computing the daily temperatures.

From this he predicted that crops of 1735 would be retarded as compared with preceding year.

Investigations on the relation of temperature, to date of harvesting, have been made by Mr. J. Warren Smith, Section Director of the Ohio Section of the United States Weather

TEMPERATURE, PRECIPITATION & DATE CURVES



Reanner, in 1735, who was the first to make comparisons of quantities of heat required, found that for each successive year the sums of the daily temperatures were approximately constant. He compared the three growing months, April, May and June, of the years 1734 and 1735.

In 1734 the sum-total of the mean daily temperatures was 1160° C., while in 1735 the sum-total was only 1015° C.

Bureau. Mr. Smith obtained dates of harvesting wheat for several years from Mr. C. E. Thorne, of Ohio Experiment Station, and from Mr. Monk, of Dayton, Ohio.

He then found the normal temperature and precipitation for each place, and for the State each year that the date of harvesting was given. The data which he obtained is graphically illustrated on the accompanying charts. The base line

in each set of curves corresponds with the normal temperature, precipitation and date of harvesting.

Dates earlier than the normal, and precipitation and temperatures above normal, are shown above the line. While dates later than normal, and deficient precipitation and temperature are shown below the line.

"The most noticeable feature of the curves shown on the accompanying chart is the uniformity of the temperature and date lines. When one fluctuates near the normal, the other is not far from it, and when the mean temperature for the three months is considerably above the normal the date of harvesting is correspondingly early, but when the temperature is much below the normal the date of harvesting is relatively low. On the contrary the precipitation and date curves show plainly that an excessive precipitation during April, May and June is not conducive to an early harvest, but that the earliest harvests come with a high temperature accompanied by a deficient precipitation. In 1899 at Osborn and Dayton the date of harvesting was the earliest on record, although the mean temperature was not so high as in 1896. But in 1896 the total precipitation was only slightly below the normal, while in 1899 there was the greatest deficiency on record. But further, if we analyze the tables by months we see that the precipitation in June, 1899, was more deficient than in the two previous months, while in June, 1896, not only was the precipitation slightly in excess, but the mean temperature was deficient.

"In 1880 the date of harvest was only one day later at Osborn than in 1899. Unfortunately the temperature observations were not begun at Dayton until 1883, but at Columbus the mean for the three months was 3.6 above normal."

The chart and the accompanying discussion of the same by Mr. Smith were

taken from the Annual Summary for 1899, of the Ohio Section of the U. S. Weather Bureau. C. N. M.

The Veterinarian's Attitude Toward His Practice.

The subjects of veterinary treatment are those domestic animals useful to man and in especial their diseases and the cause of the same. The practical work of the veterinarian is to protect animals from disease, to heal the ill ones and render life-saving assistance in emergency cases. To accomplish this the veterinarian should cultivate as much as possible all his mental faculties and should try and make himself adept in the practical manipulations.

A mere theoretical knowledge never suffices to make a good veterinarian; alone, the knowledge he acquires from school is never adequate to the demands of routine practice.

The first task which confronts the young man who has just launched himself upon the sea of practical life, that he may be of service to his state, patrons and himself, is to familiarize himself with the locality in which he has settled. He should study the habits and customs of his clients, stock owners, farmers, etc., from whom he gains his income; the soil, the sub-soil, the herbage and flora, the weather and the like.

The race peculiarities of the stock, the way they are kept and handled, their food, stable arrangements, use, and the individual owner's peculiarities should merit his attention. He should, further, note whether or what diseases are miasmatic to the locality, to what cause enzootics which occur may be ascribed and he must know how much influence the use the owner puts the animal to has upon its health. This all may be gotten by studying nature, by mixing with the people, attending agricultural

and veterinary gatherings, picnics and by reading proper agricultural and veterinary journals.

A thorough knowledge of these things is useful to the practitioner: (1.) That he may recognize the causes of disease and the means of dealing with them; (2.) to make his diagnosis and prognosis; (3.) to treat his patients more rationally; (4.) to better understand the breeding and care of animals. This knowledge will be helpful in Etiology: He must become acquainted with the type of diseases most apt to prevail in his neighborhood, and if enzootic (miasmatic), make the farmers at institutes, etc., acquainted with the connection between the disease and the existing local conditions, that he (the owner) may be able to avoid the disease in the future; for instance, moon-blindness in German horses. By change of manure, food and draining the soil, this disease, formerly which played havoc with the horse-breeding industry, was reduced from 75 per cent. to 4 per cent!

Diagnosis: A knowledge of the diseases which most frequently occur in your district is of great help in diagnosing in insipient stages. What might appear a simple eye disease in one locality, in another, where periodic ophthalmia is common, the disease may be diagnosed in its earliest stages. A very high bodily temperature in an anthrax infected district makes one suspect anthrax, etc.

Treatment: The treatment is often governed by the local conditions. A knowledge of these may make it possible to produce a speedy cure by simple hygienic measures (change of food, changing stable, etc.)

Breeding: A thorough knowledge of the region helps the veterinarian determine the best race or kind of animals to cultivate there, and thus he may be able by importations of suitable animals to bring wealth and prosperity into his locality. In all this, a thorough knowl-

edge of "the location" helps him in a practical way, and otherwise makes his technical influence felt.

THE ATTITUDE OF THE VETERINARIAN TOWARD THE OWNER, GROOM AND HIS COLLEAGUES.

The veterinarian's professional duties bring him in contact with all kinds of people. He must have dealings with the poorest and with the richest; with the lowest horse jockey and with the most intelligent and educated men; with the uncouth and untutored servant girl and with the hysterical, fantastic woman whose "darling little lap dog" is ailing. A veterinarian comes into contact with all degrees of rowdiness, politeness, ignorance and education; egotism and pride; trickery and honesty; with characters bad and good must he find his way during his business career. His general and technical education, his adeptness and policy must here stand him in good stead that from each and every one he command the respect and confidence his professional position demands.

Says Gerlach: "We must be as ready to serve the humblest and poorest of our patrons as we are the most powerful and rich. Toward persons of high station be not too plebeian; nor to those of low life too haughty nor arrogant. Be careful and thoughtful in speech everywhere, and especially where you are a stranger, for by what you say among them often are you judged."

Though discreet silence is not so much demanded of the veterinarian as of the general practitioner of medicine, he should be careful in speaking of his patients, for many owners do not care to have it known abroad that their animals are ill.

A veterinarian should cause an unshatterable conscientiousness to enter into all his advice and business dealings. Often are we tempted to suggest that an owner sell or dispose of an animal with a hidden

blemish, and purely in the spirit that we are doing him a good turn, but we must remember that such advice must, as far as the new owner is concerned, be pregnant with the spirit of fraud and trickery.

THE THREE CARDINAL QUESTIONS.

Three questions confront us at every visit we make to an ailing beast:

1. What ails the animal? usually the owner's first query. Here, in our answer, we are apt to err by going to either of two extremes; either we say too little, tell the owner nothing at all, or we say too much, imparting to the owner knowledge which he does not care to know.

Says Gerlach: "Never be in too much of a hurry to answer this question; always wait until you have completed your examination, and then in a few plain words, avoiding as much as possible technical expressions, inform the owner. An owner never accepts a scientific answer as readily as a popular one. If there be no other name for the particular malady other than a vague technical one, simply mention of the organ diseased (f. i. instead of valvular disease, say "heart trouble.") Never give an owner a long lecture on the case, using words he does not understand.

2. "Is the disease dangerous; is it curable; will it lay the animal up long?" etc., are further questions. An important, but at the same time, difficult part of practice is to answer these questions in a way satisfactory to yourself and client. These questions include the whole prognosis, course and duration of the disease in question.

The prognosis must include the curability, the duration and the termination of the disease, the resulting disease, and the usefulness of the animals for certain purposes after the disease has passed away. Make it with care. It is not always possible the first visit, and may change during course of disease. Give

percentage of recoveries if you can, and not too many "ifs" and "ands."

Undertake no chronic cases, taking weeks to bring about a healing, without telling owner course, etc.

Operations of danger should never be undertaken without the owner's special permission.

Use of "scar leaving" methods should, if possible, be avoided.

Where we neglect this we are apt to subject ourselves to bitter reproach from the owner. "If an owner offer you a large sum to perform a dangerous operation at your own risk, answer him by saying that your art and care are not measured by the reward, and even without the special reward you would exercise the same care," says Gerlach.

3. "What caused the disease?" Be careful here in your answer that you do not unnecessarily expose some person, who may have innocently been at fault, to ridicule, or that you cast blame where it does not belong. Conditions which are evil in the hygiene, food and water and use of the animal we should draw the owner's attention to, that in the future repetitions of the malady be avoided. For instance, an owner can justly submit you to ridicule if repeated outbreaks of a disease occur which might, at your first call, have been avoided by diligently going ahead, finding and pointing out the cause to the owner.

CONSULTATIONS.

If an owner does not seem in every particular perfectly satisfied with your treatment, willingly acquiesce to his suggestion that some colleague be called in consultation. We may often ourselves suggest it when a very valuable animal is very ill. Never consult with a quack, in polite words refuse, and if the owner still persist in calling in some empiric, throw up the case. Any consulting done by the owner behind our backs we should not tolerate.

ATTITUDE TOWARD SERVANTS.

It is an old maxim which says that "familiarity brings contempt." We may treat these people kindly, approaching them in a friendly way, but, at the same time, should so comport ourselves toward them that our self-respect be maintained and our professional dignity be not lowered. Never make boon companions of them. By doing this, they learn to look upon you as one of their own feather, and after a time will break through our reserve and thus place us in the category of the undignified and little respected "hoss doctor." If they neglect the patient, warn the owner. Remember your dealings are to be with the patient and owner, not with the groom or attendant.

ETHICS.

As to yourself: Be not boisterous in your efforts to express by words your imaginative knowledge of all that relates to your calling. Endeavor to advertise yourself more through act than through word and let your behavior be always like unto that grand old man whom all learned to honor and respect, love and cherish, and whose memory will ever live among us an example of self-effaciveness, unobtrusiveness, non-scheming honest integrity—the memory of Dr. Orton.

As to your colleagues: If you can but speak ill of them, hold a silent tongue. If you must needs criticise their work, do it in as mild language as is consistent. Tend rather to cover up their mistake than to flaunt them before the clientele.

In all your relationships with the members of your fraternity bear in mind that Scriptural injunction—the Golden Rule, "That ye do unto others as you would have others do unto you."

D. S. WHITE.

"The season is much, the farmer is more. Crops follow judgment more than weather."

The Demand for Agricultural Scientists.

The report of the Secretary of Agriculture for the year ending June 30, 1899, is one of the most comprehensive ever submitted from that department. It touches upon the work regularly carried on by the several bureaus, divisions and offices, and also indicates the new lines of scientific inquiry inaugurated by the department for the benefit of producers in the several States. The numerous and urgent references to the needs of educated men in all the departments is worthy of careful consideration and is full of suggestion to the students in our Agricultural Colleges.

In almost every department there is a lamentable lack of competent scientists to properly carry on the work, and a great deal of the time and energy of the various divisions must be spent in training the men employed in them. In several of these divisions this need is so keenly felt that extensive reference is made to it in the report.

The report further states that "One great difficulty is to find an adequate number of men who have had proper training to fit them to prepare publications or carry on investigations in the manner which our work requires. As a rule, the men who are best fitted for this work are engaged in other enterprises, and cannot be induced to enter the department's service on the terms necessarily imposed. * * * Considerable effort has been made to ascertain who are available candidates for positions in this service. The establishment of Agricultural Colleges for education in the sciences relating to agriculture has done something toward preparing scientists in many lines in which very little has been done, and this is one of them."

Under the head of Agricultural Education, we find one of the most compre-

hensive and suggestive statements of the necessity of agricultural education that we have ever seen from so eminent a source. It is as follows:

"The great prosperity of the country at the present time has resulted, among other things, in a largely increased attendance upon our universities, colleges, and other institutions of learning. When we consider that half the people of the United States are occupied in producing from the soil directly; that about three-fourths of our exports to foreign countries come from the soil, and that the \$600,000,000 balance of trade coming to the United States during each of the last two fiscal years have been, to a great extent, the price of farm products, it is somewhat remarkable that so very little attention is given to the education of half the people of the nation and their preparation for their future life work."

"The beautiful valleys of the mountain and Pacific-coast States are being injured to a considerable extent by the injudicious use of irrigating waters. The pasture lands of the public domain west of the Missouri River are being rapidly destroyed by injudicious grazing. The wheat-growing area of the country, where crops are grown continuously, are refusing to yield as they did when first brought under cultivation; and from the Dakotas to the Pacific we find systems of fallowing in operation and crops of wheat being taken once in two years, indicating the rapid destruction of the plant food in the soil."

"The people cry aloud to this Department for help. We have gone repeatedly but in vain to the Civil Service Commission and had them advertise throughout the country for soil physicists in order that we might co-operate with the people regarding the deterioration of their soils. All the older sections of the United States have injured their soils by

injudicious management. A knowledge of plants—their life history, the diseases to which they are subject, their relations to the soil, the climate, and food necessary to their best development—is so scarce among us that plant physiologists and pathologists can not be found by advertising for them."

"Animal husbandry is every little understood, and in most of the educational institutions of the country sufficient instruction is not being given to have it better understood, yet from this source we make our most profitable sales to foreign countries. The Biological Survey and other Divisions have also to train the men to do their work. When the Department requires the assistance of men educated along these lines it is necessary to educate them in its own scientific Divisions, under the direction of its own scientists. When it has trained such men until they become expert and stand at the head of their specialties in the United States (and in many cases in the world), then wealthy institutions take them away by offering higher salaries, interfering with the work of the Department, along the lines mentioned, which is so necessary to the producers of the United States."

"To meet some of these difficulties and avoid in future their frequent recurrence, I have arranged with the Civil Service Commission to make a register of the graduates of the land-grant colleges of the United States (those endowed by Congress to educate the young farmers of the country). From this registration the scientific Divisions of the Department select young men who will assist the Division scientists in their work, and have opportunities for post-graduate study and for better preparing themselves along the lines of applied science, whereby the producer is helped by the scholar. We pay these young men no more than we pay a laborer, and much

of the work they will perform in the Divisions could be performed by skilled laborers."

"Slight inquiry into education along the lines of agricultural science will show that there is no university in the land where the graduate of an agricultural college who has been studying along the lines indicated can take post-graduate work. The scientific Divisions of the Department of Agriculture come nearer furnishing the necessary facilities than can be found elsewhere. If two or three young men come to each of our scientific Divisions and study along the lines of the application of science to production in the field, the stable, and the farm factory, the Department will in a few years have a force from which it can not only fill vacancies when wealthy institutions take away trained men, but be able to supply the agricultural colleges, experiment stations, and other scientific attainments in these branches."

"By this new departure the Department is merely arranging to meet the imperative demands of the producers of the country for help to solve the problems that are beyond their education and their means. The Congress of the United States, in providing for the endowment of agricultural colleges and experiment stations, did more for the agriculture of the country than has been done by governmental agency for the people of any other nation. Congress could not endow these institutions with teachers trained in the applied sciences relating to the farm, but Congress has built up the Department of Agriculture and encouraged the development of the foremost scientists known in their several specialties. The step we have taken toward bringing the brightest students of the agricultural colleges to prosecute their studies under the supervision of scientists in this Department is one step

necessary to complete the educational system."

"Something no doubt remains to be done at the other end of the educational line. The education of the young farmer in the district and high schools should be such as to help him toward the agricultural college. The other educational institutions of the country have done their work well, but so abundantly that the college graduate upon leaving college is not sure of employment that will give the salary of a brakeman on the railroad. Only a very few of those who upon leaving college must earn their livelihood through their literary education are sure of incomes equal to that of a locomotive engineer. The great unexplored field for the educator is along agricultural lines. Half the people of the United States are interested in it. The prosperity of our country as a nation among nations depends upon it."

"I hope to have the approval of Congress in this effort to provide for the higher education of the graduates of the agricultural colleges by appropriations sufficiently considerate to justify the very moderate expense that will be entailed."

"In my last Annual Report, I referred to the growing interest in elementary instruction in the sciences that relate to agriculture, and mentioned the special appropriation of \$25,000 made by the State of New York to be used in aiding the introduction of nature teaching into the common schools and the carrying on of simple agricultural experiments in different parts of the State under the supervision of the College of Agriculture of Cornell University. Encouraging progress has been made during the year in this movement. The work at Cornell has been materially extended, and colleges in other States are affording opportunities for teachers in the common schools to receive such special instruction as will fit them to give elementary

courses in nature study. In Missouri a recently enacted law calls for instruction in agriculture and horticulture in the common schools, and during the past summer a considerable number of Missouri school superintendents and teachers spent some time in attending lectures and formulating elementary courses of instruction in these studies."

Book Reviews.

"The Choice of a College," by Charles F. Thwing, President of Western Reserve University. 12mo.; 32 pp. The T. Y. Crowell & Co., New York and Boston. Price, 35 cents.

Dr. Thwing speaks with authority. His acquaintance with college life is wide, and therefore what he says deserves respectful consideration even if it were not marked by temperance, calm wisdom and appealing fairness. He discusses the question of the rural or urban college, the denominational or unsectarian institution, the large or the small college, the Eastern or the Western. He discusses the co-education of the sexes, the dormitory system, athletics and various other problems that confront the prospective student. The book is of real helpfulness and value.

"A Century of Science," by John Fiske. Cloth, pp. 477. Houghton, Mifflin Co., Boston. Price, \$2.00.

To those who have read the previous production from the pen of this author the statement of his name will be a sufficient recommendation. This book is written in the same attractive and interesting style which makes all of Mr. Fiske's historical and philosophical writings, even on abstruse subjects, such fascinating and agreeable reading. The book as a whole is somewhat fragmentary in nature, but the separate chapters are complete in themselves, and the variety of subjects treated will increase rather than decrease the interest of the

general reader. The title chapter of the book is a complete review of the marvelous strides in the various branches of science during the last century, and the changes wrought thereby in the lives and thoughts of men. The chapters on the doctrine of evolution, its scope and purport, and the part played by infancy in the evolution of man, are complete and comprehensive expositions of these theories and will be of special interest. Chapters of biography and description from the pen of this author will always be read with interest, and help to make this book one which should find a place in every library.

"Fertilizer Facts for Farmers," by William Morrow. Cloth, 12mo., 64 pp. The book may be obtained from the author, Hartwell, Ohio. Price, 25 cents.

This intensely practical little book is full of suggestions which will prove valuable to every farmer or gardener. There are chapters on the composition of plants, plant growth, the source of commercial fertilizers and their application, the three essential plant foods and their relative importance to the various farm crops. Various other subjects of general interest to the farmer are also discussed. The practice of the principles of fertilizers and their application as outlined in this little book will result in an abundance of crops and a contented mind.

"Home Pork Making," by A. W. Fulton. Illustrated, 12mo., 144 pp., cloth. Orange Judd Company, New York. Price, postpaid, 50 cents.

This new and intensely practical book is a complete guide for the farmer, the country butcher and the suburban dweller, in all that pertains to hog slaughtering, curing, preserving and storing pork product—from scalding vat to kitchen table and dining room. There are chapters on pork making on the farm, finishing off hogs for bacon,

slaughtering, scalding and scraping, dressing and cutting, what to do with the offal, the fine points in making lard, pickling and barreling, care of hams and shoulders, dry-salting bacon and sides, smoking and smoke houses, keeping bacon and hams, side lights on pork making, and packing house cuts of pork. Every detail connected with the raising of porkers and the proper management and best and most satisfactory methods of utilizing pork are so clearly and fully presented that, even without experience or special equipment, any intelligent person can readily follow the instructions.

"Scientific Horseshoeing," by Professor William Russel. Cloth, 8vo., 295 pp. Robert Clarke Co., Cincinnati, Ohio. Price, \$4.00.

This book, in many respects, may be considered standard authority on modern farriery. The author has been a practicing farrier for more than fifty years and has long deplored the errors existing in the common methods of shoeing, and the evils resulting therefrom. The increasing demand for information on this subject is a sure indication that the people also are awakening to the wrongs which have been perpetrated on man's most intelligent and faithful dumb servant by ignorant farriers.

This book gives the practical details of the most approved and rational plans and principles of scientific horseshoeing in the plainest and most complete manner possible. Every chapter contains much new matter of added value, covering every branch of the subject, all arranged under heads easy to find, remember and utilize. After defining the proper method of shoeing for the normal conditions of the perfect horse, the author proceeds to discuss the treatment of imperfect feet, faults of conformation, defects of action, etc. A large portion of the work is devoted to "Lameness and

Diseases of the Foot and Leg," and in this connection the subject of "Pathological Shoeing" is fully treated. Nearly 250 different patterns of shoes, to serve every purpose and meet every exigency, are represented and described, which, with the large number of colored plates of anatomical sections and abnormal conditions of the foot and leg, are distinctive features of this book.

We regret that the price of this book, (of so much practical value to horsemen, breeders and farmers, as well as professional shoers), is, in our opinion, beyond what the size and nature of the volume warrants, and will result in greatly lessening the possible benefits to the class of people for which it was written.

"Sermons in Stones," by Amos R. Wells. Cloth, pp. 342. Doubleday & McClure, New York. Price, \$1.00.

As the title indicates the book contains practical lessons drawn from the common things of everyday life. These spiritual analogies are clear and forceful and, drawn from the stones, flowers, the familiar scenes of the street and store, cannot help but bring courage and hope to the everyday tasks that we are wont to call drudgery. The beautiful lessons found in this book will stimulate us to be always looking for

"Sermons in stones,
Books in running brooks,
And good in everything."

This book will be found of practical benefit by those who are in search of illustrations for lectures, talks, etc., and will be sent postpaid to any address on approval, to be paid for if satisfactory, or to be returned if not wanted after examination.

"A first class battleship costs about as much as four thousand miles of good macadam highway,—a greater distance than from Boston to San Francisco."

